any sign switching of $u - U_M$ .on the other hand, from Eqs. (3.2), (3.3) and $|u| \le U_M$, in such a sliding mode

$$K_m(1-q)U_M \le \left|\dot{\sigma}\right| = g\left|\frac{h}{g} + u\right| \le K_M\left(1+q\right)U_M$$

Thus, $\dot{\sigma}_0 \le K_M\left(1+q\right)U_M$, and the condition

$$\left|\frac{\dot{\sigma}_M}{\dot{\sigma}_0}\right| < \frac{K_m(1-q)U_M}{K_M(1+q)U_M} = \frac{K_m(1-q)}{K_M(1+q)}$$

Is sufficient to avoid keeping $u = \pm U_M$ in sliding mode. The resulting condition above coincides with eq. (3.5) in text.

This completes the proof of the theorem.